WHAT IS CLAIMED IS:

1. A compound semiconductor device having a stack formed on a substrate,

said stack comprising a first nitride semiconductor layer which later becomes an electron transit layer;

a second nitride semiconductor layer which later becomes an electron supply layer and contains Al; and

a third nitride semiconductor layer having an Al content of zero or smaller than that of said second nitride semiconductor layer, all of the layers being sequentially grown on said substrate, wherein

said third nitride semiconductor layer has a nitrogen vacancy ratio of 20% or less within a range as deep as 2 nm or less from the surface thereof.

2. The compound semiconductor device according to claim 1, wherein compositional ratio x of Al and thickness d (nm) of said second nitride semiconductor layer satisfy the relations of:

$0.14 \leqq x \leqq 0.16$;

and

$17 \leqq d \leqq 24$;

and said stack has a sheet resistance of 550 Ω/sq to 850 Ω/sq.

3. The compound semiconductor device according to claim 2, wherein said second nitride semiconductor layer include therein at least one portion having the compositional ratio x which exceeds the above-described range but not larger than 0.3.

4. A compound semiconductor device having a stack formed on a substrate,

said stack comprising a first nitride semiconductor layer which later becomes an electron transit layer;

a second nitride semiconductor layer which later forms an electron supply layer and contains Al; and

a third nitride semiconductor layer having an Al content of zero or smaller than that of said second nitride semiconductor layer, all of the layers being sequentially grown on said substrate, wherein

said second nitride semiconductor layer is formed in a thickness so as to satisfy the following relation:

$-80x+29<d<-180x+52$

where x denotes the compositional ratio of Al and d (nm) denotes the thickness.

5. The compound semiconductor device according to claim 4, wherein said third nitride semiconductor layer has a thickness of 10 nm or less.

6. The compound semiconductor device according to claim 4, wherein said second nitride semiconductor layer has a compositional ratio $\bar{x}$ of Al of

$0.125 \leqq x < 0.18$.

7. The compound semiconductor device according to claim 4, wherein compositional ratio x of Al and thickness d (nm) of said second nitride semiconductor layer satisfy the relations of:

$0.14 \leqq x \leqq 0.16$;

and

$17 \leqq d \leqq 24$;

and said stack has a sheet resistance of 550 Ω/sq to 850 Ω/sq.

8. The compound semiconductor device according to claim 4, wherein said second nitride semiconductor layer include therein at least one portion having the compositional ratio x which exceeds the above-described range but not larger than 0.3.

9. The compound semiconductor device according to claim 1, further comprising a gate and source-and-drain regions on said stack,

said gate having a threshold voltage of -2.5 V to -1.5 V.

10. The compound semiconductor device according to claim 9, showing a current value of 150 mA/mm to 300 mA/mm at a gate voltage Vg of 0.

11. The compound semiconductor device according to claim 1, wherein said second nitride semiconductor layer is doped with an n-type impurity, said impurity having a concentration Nd ($/cm^3$) of

$1 \times 10^{14} \leqq Nd \leqq -2 \times 10^{19} x + 5 \times 10^{18}$.

12. The compound semiconductor device according to claim 1, wherein said first and third nitride semiconductor layers contain GaN and said second nitride semiconductor layer contains AlGaN, and

a difference value (arcsec) of an AlGaN peak and a GaN peak measured using X ray (Kα line) under

(0004) diffraction falls within a range from 300 to 400.

13. A method of fabricating a compound semiconductor device comprising the steps of:

forming a first nitride semiconductor layer, which later becomes an electron transit layer, on a substrate;

forming on said first nitride semiconductor layer a second nitride semiconductor layer which later becomes an electron supply layer and contains Al; and

forming on said second nitride semiconductor layer a third nitride semiconductor layer which is controlled so as to have an Al content of zero or smaller than that of said second nitride semiconductor layer, and a nitrogen vacancy ratio of 20% or less within a range as deep as 2 nm or less from the surface thereof.

14. The method of fabricating a compound semiconductor device according to claim 13, wherein said first to third nitride semiconductor layers are formed by growth based on the MOCVD process;

said second and third nitride semiconductor layers being formed by growth under a temperature condition of 1,000°C or above, and after completion of the growth of said third nitride semiconductor layer, a flow rate of NH_3 is increased than that during the growth of said third nitride semiconductor layer.

15. The method of fabricating a compound semiconductor device according to claim 13, wherein H_2 is used as a carrier gas during the growth of said third nitride semiconductor layer, and N_2 is used as a carrier gas after completion of the growth.